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From the INTERNATIONAL SEARCHING AUT	HORITY	DIVITION INC	REC'D 2 0 JUN 2005			
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NAM, Seung-Hee		1 //	PCT			
12F, Seo-Jeon Bldg., 1330-9, Seocho-Dong, Seocho-Gu, Seoul 137-858, Republic of Korea		WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)				
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		Date of mailing (day/month/year)	31 MAY 2005 (31.05.2005)			
Applicant's or agent's file reference		FOR FURTHER A	CTION			
PCT000026		-	See paragraph 2 below			
International application No. PCT/KR2005/000150	International filing date 14 JANUARY 200	05 (14.01.2005)	Priority date(day/month/year) 15 JANUARY 2004 (15.01.2004)			
International Patent Classification (IPC)	or both national classific	ation and IPC				
IPC7 H01L 33/00	- A					
Applicant SEOUL OPTO-DEVICE CO., I	TD. et al					
Box No. IV Lack of unity or Reasoned statem citations and exp Box No. VI Certain documer Box No. VII Certain defects Box No. VIII Certain observat 2. FURTHER ACTION If a demand for international prelimina International Preliminary Examining A other than this one to be the IPEA and opinions of this International Searching If this opinion is, as provided above, co	ent of opinion with regard invention tent under Rule 43bis. 1(c) clanations supporting such cited in the international applications on the international applications on the international application ("IPEA") except the chosen IPEA has not a Authority will not be suppopriate, with amendmonitation of 22 months from (220).	rd to novelty, inventive a)(i) with regard to nove th statement ication application this opinion will be con to that this does not appl iffied the International F to considered. opinion of the IPEA, the	y where the applicant chooses an Authority Bureau under Rule 66.1bis(b) that written e applicant is invited to submit to the			
Jame and mailing address of the ISA/KR						

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Korean Intellectual Property Office
920 Dunsan-dong, Seo-gu, Daejeon 302-701,
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Authorized officer

KIM, Dong Yup

Telephone No. 82-42-481-5749



International application No.

PCT/KR2005/000150 Box No. I Basis of this opinion 1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item. This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under 2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of: a. type of material a sequence listing table(s) related to the sequence listing b. format of material in wirtten format in computer readable form c. time of filing/furnishing contained in the international application as filed. filed together with the international application in computer readable form, furnished subsequently to this Authority for the purposes of search. In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished. 4. Additional comments:

International application No. PCT/KR2005/000150

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Novelty (N)	Claims	1-11	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-11	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-11	YES
	Claims	NONE	NO

2. Citations and explanations:

Reference is made to the following documents:

The present application is related to a III-V group compound semiconductor device comprising: GaN-based semiconductor layers; and an ohmic electrode layer formed on the GaN-based semiconductor layers wherein the ohmic electode layer comprises a contact metal layer, a reflective layer, and a diffusion layer and a manufacturing method thereof.

D1 relates to a GaN-based LED device in which the p-typed electrode is compsoed of Au/Ti/Ag(Pt)/Ni multilayers formed on a p-type GaN layer. D1 discloses the structure of the p-typed electrode containing a contact metal layer and a reflective metal layer. But D1 does not explain an addition of a diffusion barrier layer.

D2 also relates to a GaN-based LED device wherein a metal layer of an alloy containing a specific metal is provided in contact with a p-typed GaN semiconductor, and a Pt layer is laminated on the metal layer, and an Au-containing metal layer is laminated thereon. D2 discloses the p-typed electrode structure containing a metal layer and a diffusion barrier layer(Pt layer), but D2 does not suggest the existence of a reflective layer like as a Ag or Al layer in the p-typed electrode of the GaN-based LED device.

D3 discloses a GaN-based LED device in which the p-typed electrode is compsoed of a reflective a layer and a metal contact layer. But there in no explanation of a diffusion barrier layer in the p-typed electrode in D3.

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International application No.

PCT/KR2005/000150

Supplemental Box

In case the space in any of the preceding boxes is not sufficient. Continuation of:

BOX V.

D4 discloses an annealing process of a p-typed elctrode of a GaN-based compound semiconductor device. In D4, the thermal treatment is split into a first thermal treatment and a second treatment; and the first thermal treatment is carried out in an oxygen-containing atmosphere at a comparatively low temperature, and a second thermal treatment is carried out in an oxygen-free atmosphere which is at a comparatively high temperature. In a point that the annealing process is carried in an oxygen atmosphere, the technical feature of D4 is similiar to the annealing process of this application. But D4 dose not disclose the p-typed electrode which contains a contact metal layer, a reflective layer, and a diffusion barrier layer successively.

As explained above, none of the documents D1-D4 refers to the p-typed electrode which contains a contact metal layer, a reflective layer, and a diffusion barrier layer successively.

Therefore, D1-D4 are considered to be little relevant to the present application.

Compared with the prior art as cited in the International Search Report, the present invention(claims 1-11) is believed to be novel and to involve an inventive step under PCT Article 33(2) and 33(3).

And the present invention has industrial applicability under PCT Article 33(4).

PATENT COOPERATION TREATY From the REC'D 20 JUN 2005 INTERNATIONAL SEARCHING AUTHORITY . . NAM, Seung-Hee 12F, Seo-Jeon Bldg., 1330-9, Seocho-Dong, Seocho-Gu. WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY Seoul 137-858, Republic of Korea (PCT Rule 43bis.1) Date of mailing (day/month/year) 31 MAY 2005 (31.05.2005) Applicant's or agent's file reference FOR FURTHER ACTION PCT000026 See paragraph 2 below International application No. International filing date (day/month/year) Priority date(day/month/year) PCT/KR2005/000150 14 JANUARY 2005 (14.01.2005) 15 JANUARY 2004 (15.01.2004) International Patent Classification (IPC) or both national classification and IPC IPC7 H01L 33/00 Applicant SEOUL OPTO-DEVICE CO., LTD. et al This opinion contains indications relating to the following items: Box No. I Basis of the opinion Box No. II Priority Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability Box No. IV Lack of unity of invention Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement Box No. VI Certain documents cited Certain defects in the international application Box No. VII Box No. VIII Certain observations on the international application 2. FURTHER ACTION If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered. If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later. For further options, see Form PCT/ISA/220. For further details, see notes to Form PCT/ISA/220. Name and mailing address of the ISA/KR

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International application No.
PCT/KR2005/000150

В	x No. 1	Basis of this opi	nion						
1.	With r	regard to the langu it was filed, unless	age, this opinion of the state	n has been establicated under this i	ished on the batem.	asis of the inte	rnational applicat	ion in the lar	iguage in
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International application No. PCT/KR2005/000150

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Novelty (N)	Claims	1-11	·	YES
•	Claims	NONE		NO
Inventive step (IS)	Claims	1-11		YES
	Claims	NONE		NO
Industrial applicability (IA)	Claims	1-11		YES
	Claims	NONE	•	NO

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International application No.

PCT/KR2005/000150

Supplemental Box

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BOX V.

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As explained above, none of the documents D1-D4 refers to the p-typed electrode which contains a contact metal layer, a reflective layer, and a diffusion barrier layer successively.

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Compared with the prior art as cited in the International Search Report, the present invention(claims 1-11) is believed to be novel and to involve an inventive step under PCT Article 33(2) and 33(3).

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